

“Further Note on the Sensory Nerves of the Eye-Muscles.” By
C. S. SHERRINGTON, M.A., M.D., F.R.S., University College,
Liverpool. Received September 21,—Read November 17,
1898.

In a communication on the sensory nerves of muscles laid before the Society last year,* the question previously raised† as to the existence of afferent nerve fibres in the so-called “motor” cranial nerves for the muscles of the eye was advanced to the following position. Myelinated nerve-fibres from the IIIrd cranial and IVth cranial nerve-roots were traced into the tendons of the recti and oblique muscles. Since then control observations have been made. The ophthalmic division of the Vth cranial has been severed at its origin, and with it the VIth cranial trunk. This has been done in the monkey. The condition of the nerve branches going to and lying within the muscles and tendons has been examined after an interval of twelve to fourteen days. Those of the external rectus contained nothing but degenerate nerve-fibres, save for a few fine myelinate fibres, probably from the ciliary ganglion. Those of all of the other eye-muscles contained exclusively healthy nerve-fibres. The sensorial musculo-tendinous organs of the eye-muscles are, therefore, not innervated by the ophthalmic division of the trigeminus. On the other hand, the nerve-fibres of the external rectus muscle behave, after severance of the VIth cranial nerve, in the same way as my previous papers showed those of the other eye muscles do after section of the IIIrd and IVth nerves.

A contribution towards the physiological inquiry into the matter has been made as follows, and has given a clear reply. The conjunctivæ, both palpebral and ocular, and the corneæ of both eyes have been rendered deeply anæsthetic to cold, warmth, touch, and pain by liberal applications of cocaine. Then in a completely dark room the power to direct the gaze with accuracy in any required direction has been tested. The person under examination is seated, with the head securely fixed, in front of a screen. One of his hands carries a marker. The hand is moved by an assistant, and is made to mark the screen at some one point; it is then passively replaced. The person under observation during this time keeps the eyes open in the primary position or sits with them closed. He is then required to direct his gaze to the spot marked on the screen. The light is then switched on, and the point to which the gaze is turned is noted. The power to direct the gaze under these circumstances has been found to remain good. If for co-ordinate execution and ability to perform the delicate adjustments for training

* C. S. Sherrington, ‘Roy. Soc. Proc.’ vol. 61, p. 247, February, 1897.

† C. S. Sherrington, ‘Physiol. Soc. Proc.’ No. 3, June, 1894.

the eyeballs correctly in any desired position the exercise of peripheral apparatus of muscular sense is required, the only possible channels under the above conditions would seem to be deep branches of the Vth nerve or the IIIrd, IVth, and VIth so-called "motor" nerves themselves. As previously stated, the former are by both my earlier and later degeneration experiments excluded. The latter, therefore, are the only ones remaining, for the superficial branches of the Vth and the retinae are put out of action by the conditions of experiment.

I am indebted to Mr. E. E. Laslett for carrying out the observations with me. Details regarding the methods employed and the results obtained will be given in a completer paper written in conjunction with him.

"An Experiment in Search of a Directive Action of one Quartz Crystal on another." By J. H. POYNTING, Sc.D., F.R.S., and P. L. GRAY, B.Sc. Received September 27,—Read N'vember 17, 1898.

(Abstract.)

A quartz sphere, 0.9 cm. diameter, weight 1.004 grams, was suspended by a long quartz fibre so that its time of vibration was about 120 seconds. A second quartz sphere, 6.6 cm. diameter, weighing 399.9 grams, with its centre on a level with that of the first and 5.9 cm. from it, was rotated continuously in a period of 115 seconds in one series, and in a period of 230 seconds in another series of observations.

The axis of the smaller sphere was horizontal and perpendicular to the line through the centres. Any directive action should manifest itself as a periodic couple, producing forced oscillations in the smaller sphere.

If the ends of the axis of a quartz crystal are indistinguishable the couple should go through its values in half a revolution of the larger sphere. This is termed the "quadrantal" couple, and to test for it the time of revolution was 230 seconds, or nearly double that of the suspended sphere. If the ends of the axis are poles, like those of a magnet, the couple should go through its values only in a complete revolution. This is termed the "semi-circular" couple, and to test for it the time of revolution was 115 seconds, or nearly equal to that of the suspended sphere. The position of this latter sphere was read by means of mirror and scale every 11.5 seconds, *i.e.*, at ten equidistant phases of the 115-seconds period. By taking a large number of periods, the mean reading for each phase should be freed to a great extent from other periodic motions and accidental disturbances, and a 115-second vibration should, if it existed, be rendered evident.